CARBON-FOOTPRINT POLICY OF THE TOP TEN GLOBAL RETAILERS: CONTRIBUTION TO SUSTAINABLE DEVELOPMENT

Carmen Bălan*
The Bucharest Academy of Economic Studies, Romania

Abstract
The goal of the article is to study the policy of the most prominent ten global retailers relative to the reduction in their carbon footprint. This policy is an integral part of the environmental component of the organizational policy for sustainable development. The research has an exploratory character and is based on the analysis of public information available on the Internet about the objectives, strategies and achievements of the top ten global retailers in the field of carbon-footprint. According to the research objectives, the main results of the study reveal: the organizations that have sustainable development objectives and policies as well as carbon-footprint objectives and policies; the strategies applied for the reduction in their carbon footprint and the results obtained. Are the top ten global retailers a benchmark as regards the carbon-footprint policies? Do they represent a model which has to be followed by other retailers? Several answers may be found in the present article.

Keywords: sustainable development, environmental assessment, ecological footprint, carbon footprint, greenhouse gas emissions, global retailers

JEL Classification: M1, M16

Introduction

Experts became aware of the signs of developmental and environmental crisis in the 1970s. The limits of growth were highlighted by ecologists (Meadows, et al., 1972). The term "sustainability" appeared in the economic vocabulary to describe an economy in equilibrium with basic ecological support systems (Stivers, 1976).

The concept of "sustainable development" has captured the attention of experts and world organizations starting with late 1980s. The awareness of the topic was triggered by the Brundtland Report (known under the title "Our Common Future") which was prepared by the World Commission on Environment and Development chaired by the Norwegian prime minster Gro Harlem Brundtland. The report presented in 1987 defined the concept of sustainable development in an explicit and simple manner that remained relevant until

* Author's contact: e-mail: cbalan@ase.ro

today. Thus, sustainable development is "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (United Nations General Assembly, 1987, p. 54). As highlighted by the report, the three components of the new concept are the following: environmental protection, economic growth and social equity.

The concept of sustainable development led to the first Earth Summit, respectively the United Nations Conference on Environment and Development (UNCED) at Rio de Janeiro (Brazil) in June 1992. The objective of the conference was to build upon the Brundtland Report and respond to global environmental challenges related to biodiversity, climate change and forest management. The summit has declared that the right to development must be fulfilled so as to equitably meet developmental and environmental needs of present and future generations. Among the signed agreements range the Framework Convention on Climate Change and Agenda 21 (called a "blueprint" for sustainable development). In December 1992, the UN General Assembly established the UN Commission on Sustainable Development (CSD) to ensure the effective follow-up of the Earth Summit.

Today, sustainable development is viewed from a triple perspective (Strange & Bayley, 2008, p. 30). Firstly, sustainable development is a conceptual framework that is able to promote a more holistic and balanced approach at world scale. Secondly, it is a process that consists in considering the integrated impact on society, environment and economy of each decision made. Thirdly, it is an end goal that requires specific policies and solutions.

The concept of sustainable development was adopted progressively by world organizations, countries and an increasing number of companies. From a simple concept employed by experts, sustainable development became the objective of macro-policies/strategies. The European Union has a Sustainable Development Strategy (EU SDS) and revised it in 2009. The SDS reflects the long-term vision of the EU according to which sustainability implies three mutually supportive components: economic growth, social cohesion and environmental protection (Commission of the European Communities, 2009, p. 2). The EU has taken the lead at international scale in the fight against climate change and is committed to promoting a low-carbon, knowledge-based, resource-efficient economy.

The EU approach to sustainable development is also reflected by the launch of an Action Plan on Sustainable Consumption and Production in 2008. The Commission called for the establishment of a Retail Forum. In March 2009, European retailers set up voluntarily the Retailers Environmental Action Programme (REAP) in order to facilitate the communication with the Commission and other stakeholders (producers and key consumer bodies) as well as the actions of the retail members (European Retail Round Table, EuroCommerce, 2009, p. 2). REAP stimulates companies to assume responsibilities for sustainable development by encouraging them to publicly record their individual sustainability commitments. Twenty European companies and four federations have already signed the REAP. The Programme relies on two pillars: the Retail Forum and the Matrix of environmental Action Points (MAP). The Retail Forum aims at contributing to the reduction in the environmental footprint of the retail sector and of its supply chain, to the promotion of more sustainable products and to the better information of consumers.

During the last two decades, significant strides have been made to create methods and tools for the systematic evaluation of the environmental aspects related to a good or service through the sequence of stages that represent its life cycle. A new concept gained ground -

environmental life-cycle assessment (LCA). The approach emerged in the 1980s. It became popular mostly in Europe, while in the U.S. started only recently to be adopted by companies. International Organization for Standardization (ISO) and the United Nations Environment Programme (UNEP) contributed substantially to the positive trend.

ISO has developed general standards to be a reference at world scale. The organization elaborated the standards ISO 14040:2006 (ISO, 2006a), ISO 14041:2006 (ISO, 2006b), ISO 14042:2006 (ISO, 2006c), ISO 14043:2006 (ISO, 2006d) and ISO 14044:2006 (ISO, 2006e) relative to environmental management – life cycle assessment. These standards refer to the principles and framework, goal and scope definition and inventory analysis, life cycle impact assessment, life cycle interpretation, requirements and guidelines for LCA.

UNEP is a catalyst for the development of more specific methodologies for LCA (OECD, 2005, p. 55). The programme has supported the LCA approach since the late 1990s (UNEP, 1996). It considers the LCA an analysis that covers the entire life cycle of a product from the extraction and processing of raw materials to the recycling and disposal. The assessment considers various types of environmental impact such as the use of scarce resources, the release of hazardous materials as well as the impact on local environment and the effects on global problems like ozone depletion and climate change.

Researchers started to systematically compare the life-cycle greenhouse gas (GHG) emissions associated with various types of food products. A relevant example is a study performed on the United States market that led to a holistic model that includes all GHG emissions in food supply chains (Weber & Matthews, 2008, pp. 3508-3513). The research results highlighted that GHG emissions associated with food are dominated by the production phase within the product life cycle. Thus, production phase contributes 83% of the average U.S. household's 8.1 t CO_2-equivalent/year GHG footprint for food consumption, while transportation (mainly of agricultural products from producers to food processors) contributes 11% and the final delivery from producer to retailer only 4%. According to this study, food transportation due to globalization of the market has only increased the GHG emissions by 5%.

Experts, international organizations and population started to employ the term "ecological (environmental) footprint" (EF). In essence, the EF analysis evaluates the human impact on the Earth's ecosystems (OECD, 2006, p. 153). It measures the resources required to sustain households, communities, regions and nations. EF represents the amount of biologically productive land and sea area needed to both regenerate the resources consumed by mankind and to render harmless the corresponding waste. In 2001, the global ecological footprint was 13.5 billion global hectares (gha), respectively 2.2 global hectares per person. These figures exceeded the global biocapacity by 0.4 global hectares per person or 21% (WWF & Global Footprint Network, 2005, p. 6). The deficit sharpened until 2005 when the global ecological footprint was 17.5 billion gha, respectively 2.7 gha per person, while the total available biocapacity was only 2.1 gha (WWF, ZSL & Global Footprint Network, 2008, p.14). The deficit increased to 29%.

"Carbon footprint" also captured the attention of both specialists and population. The reason is that carbon dioxide (CO_2) has the largest share in the greenhouse gas emissions. According to the OECD Factbook 2009 (OECD, 2009, p. 190), the global emissions of CO_2 have risen by 99% or an average of 2.0% per year, since 1971 when the total CO_2 emissions from fuel combustion amounted to 14,095 million tonnes. The experts estimate an

additional increase of the global emissions of CO_2 of 45% by 2030 (in a rhythm of 1.6% per year).

The carbon footprint (CF) - also named carbon profile - is a component of the ecological footprint. Carbon Trust – the independent company created by the British Government in 2001 and which helped companies from the U.K to save 2 million tons of CO_2 from their emissions in 2008 – gave a concise and relevant definition of carbon footprint (Carbon Trust, 2007). According to Carbon Trust definition, the CF is the total set of GHG emissions caused directly and indirectly by an individual, organization, event or product expressed as CO_2-equivalent.

For a specific product, the CF reflects the GHG emissions corresponding to all the stages of that product life cycle. CF is a data sub-set of the life-cycle assessment (LCA). In essence, a carbon footprint is a LCA with the analysis limited to emissions that have an effect on climate change (EPLCA & EC-JRC, 2009). The main GHG considered when measuring CF are the following: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), sulphur hexafluoride (SF_6), perfluorocarbons (PFCs). A specific value of the indicator Global Warming Potential (GWP) is associated to each category of GHG. The GWP indicator is defined as the potential relative climate change effect per kg of a greenhouse gas over a fixed time period, such as 100 years (GWP_{100}). The overall climate change impact of a product over its life cycle is calculated by adding the GWP values corresponding to different emissions.

During the past decade, large companies started to prepare corporate responsibility reports and sustainable development reports, besides the annual and financial reports. In addition, company ranking studies from the perspective of corporate governance have been made by specialized organizations. An example of such study is that commissioned by Ceres (a leading coalition of investors, environmental groups and other public interest organizations working with companies to address sustainability challenges) to RiskMetrics Group (Cogan, et al., 2008). The Ceres report is based on a specific assessment approach called "Climate Change Governance Framework" (CCGF). The framework employs a 100-point scale and includes 15 indicators grouped in five weighted sections: board oversight (12%); management execution (20%); public disclosure (14%); emissions accounting (16%); strategic planning and performance (38%). Based on this framework, the highest score was 79. Scores higher than 50 point were obtained by the following retailing companies (from those included in the sample): Tesco plc (78 points); Wal-Mart Stores, Inc. (69 points); Hennes & Mauritz AB (54 points); Carrefour S.A. (52 points) (Cogan, et al., 2008, p. 11). This ranking is significantly different from the retail sales hierarchy.

The trend towards environment stewardship leaves the place for more specific perspectives such as LCA, EF and CF assessment. The goal of the present article is to study the policy of the most prominent ten global retailers relative to the reduction in their carbon footprint.

1. Methodological aspects of the research

The terms "carbon footprint" or "carbon profile" became omnipresent for an increasing number of organizations, individuals and countries. The present article focuses on the carbon-footprint policies applied by the top ten retailers at global scale. The main objectives of the research consist in identifying: (i) the organizations that have sustainable

development objectives and policies; (ii) the organizations that have carbon-footprint objectives and policies; (iii) the carbon-footprint strategies they apply; (iv) their results.

The study has an exploratory character. This option is the most suitable because the orientation of companies towards sustainable-development policies is still in a preliminary stage about which few consolidated data exist. While the elaboration of an annual or financial report is a legal obligation for a publicly traded company, a sustainable development report is far from being mandatory. However, major groups/companies have initiated a new trend by publicly expressing their commitment to sustainable development in general and to the reduction of carbon-footprint and greenhouse gases in particular.

The data about the carbon-footprint policy of the top ten global retailers was collected from sustainable development reports or corporate responsibility reports. The Internet was selected as data source, due to the international dimension of the research.

The study focused on a sample of ten global retailers. The selection is based on two reasons. Firstly, the top global retailers are leaders in their field and may have a significant impact upon other retailers, being a potential source of successful case studies and best practices. Their presence in many countries can engender a multiplying effect able to promote a higher commitment towards environment as well as the design and implementation of effective policies aiming at reducing the carbon footprint. Secondly, the size of the sample was limited to ten global retailers due to the exploratory character of the research.

The top ten global retailers have been identified based on one of the best known and well documented hierarchies published annually. The source is the latest report of Deloitte (2009) on the global powers of retailing. The ranking of these global retailers at the top of the hierarchy is based on the retail sales achieved. In 2007, the value of their total retail sales has been USD 1,071,328 million, representing approximately 30% of the retail sales of the top 250 global retailers (table no. 1).

Table no. 1: The hierarchy of top ten global retailers in 2007

Re-tail sales rank	Company	Country of origin	Retail sales (USD mil.)	Share in the retail sales of top 250 global retailers (%)	No. of countries of operation	2002-2007 Retail sales CAGR*
1	Wal-Mart Stores, Inc.	U.S.	374,526	10.35	14	10.3
2	Carrefour S.A.	France	112,604	3.11	33	3.6
3	Tesco plc	UK	94,740	2.62	13	12.4
4	Metro AG	Germany	87,586	2.42	32	4.6
5	The Home Depot, Inc.	U.S.	77,349	2.14	7	5.8
6	The Kroger Co.	U.S.	70,235	1.94	1	6.3
7	Schwarz Unternehmens Treuhand KG	Germany	69,346[e]	1.92	24	12.6
8	Target Corp.	U.S.	63,367	1.75	1	7.6

9	Costco Wholesale Corp.	U.S.	63,088	1.74	8	10.7
10	Aldi Gmbh & Co. oHG	Germany	58,487 [e]	1.62	15	4.3
Total			1,071,328	29.61		

*Note: *CAGR = Compound Annual Growth Rate; e = estimate*.

Source: Based on Deloitte Development LLC (2009). Feeling the squeeze. Global powers of retailing 2009. *Stores*, January 2009, pp. G6-G7. [Online] Available at: http://www.nxtbook. com/nxtbooks/nrfe/stores_globalpowers0109/ [Accessed 9 September 2009].

The range of retail formats developed by the top ten global retailers is relatively large and it includes the following: apparel/footwear specialty, cash & carry/warehouse clubs, convenience stores, department stores, discount stores, discount department stores, electronics specialty, other specialty stores, home improvement stores, hypermarkets/supercenters/superstores, supermarkets.

For two of the retailers - Kroger and Target - the term "global" is employed to highlight the size of the retail sales, not the presence in several countries.

2. Objectives and policies

The research aimed to identify the retailers that have established sustainable development objectives and policies, as well as carbon-footprint objectives and policies. Six of the top ten global retailers have publicly presented sustainable objectives and policies: Wal-Mart (Wal-Mart Stores, 2009), Carrefour (Carrefour, 2009a; Carrefour, 2009b), Tesco (Tesco, 2009a; Tesco, 2009b), Metro (Metro Group, 2009), Kroger (Kroger, 2009) and Target (Target, 2008). Most of them have elaborated sustainable development reports, while Tesco and Target have corporate responsibility reports. No publicly released reports were identified for four players of the top ten: Home Depot, Schwarz Unternehmens Treuhand KG, Costco Wholesale Corp. and Aldi Gmbh & Co. oHG. Thus, these four players have not been analyzed within the framework of the present research.

The sustainability objectives have been studied from two perspectives – the scope and the formulation. The scope includes the aspects to which the objectives refer. The analysis of the formulation focuses on the extent to which objectives are concise and SMART (specific, measurable, achievable, realistic and time bound).

The sustainability approaches of most of the six players encompass all the three sustainable development pillars. For example, Carrefour group attaches an equal importance to the economic, social and environmental components of sustainability. A proof is the existence of a distinct scorecard for each component within the sustainability report. Each scorecard specifies stakeholders, key figures, commitments and objectives. Tesco, Target and to a large extent Wal-Mart and Metro group also consider all the three pillars. However, Kroger is focused on environmental and social components.

The global retailers formulated sustainability objectives in different manners. For example, Wal-Mart is a global retailer with clearly defined sustainability objectives. The group has set objectives for the economic, social and environmental fields. For example, the three

sustainability goals related to environment are: (i) to be supplied 100% by renewable energy; (ii) to create zero waste; (iii) to sell products that sustain own resources and the environment (Wal-Mart Stores, 2009, p. 16). For each goal, SMART commitments are presented. Similarly, Carrefour had an extremely large range of sustainability objectives in 2008: 16 in the economic scorecard, 17 in the social scorecard and 16 in the environmental scorecard (Carrefour, 2009a, pp. 22, 36, 50). However, many of the objectives listed by Carrefour in these scorecards are rather strategies than objectives (for example "insure value for money in all segments", "employ a policy in favor of diversity in all the countries" or "promoting waste sorting and recycling"). In addition, few objectives are quantitatively expressed. Tesco is a very good example of global retailer with SMART sustainability objectives. The group has set key performance indicators (KPI) and a specific target for each KPI for the year 2009 compared to the target and performance of 2008 (Tesco, 2009b, p. 51). For example, Tesco set as objective for 2009 to increase up to 99% the share of eligible products with nutritional on front-of-pack GDA (guideline daily amounts) labeling in the total number of eligible brands, from the level of 92% achieved in 2008. The Metro Group and Kroger also have SMART sustainability objectives. However, Target does not state in a concise and SMART manner such objectives.

Besides sustainability objectives, the research also focused on the existence of a clearly defined sustainability policy. All the six global retailers have publicly presented such policies. Some of these policies are systematically specified. In the case of Wal-Mart, the sustainability policy related to environment is concisely labeled "sustainability 360". The approach aims to engage Wal-Mart and the members of the entire global supply chain (suppliers, associates, customers) to reduce their environmental impact.

The identification of carbon-footprint objectives and policies in the sustainability reports or corporate responsibility reports of the six global players has been a distinct aim of the research. The terminology varies. Wal-Mart and Tesco include the carbon-footprint strategy in the climate strategy, respectively climate change strategy.

SMART objectives related to carbon foot-print are specific to Wal-Mart, Tesco and Metro Group. Wal-Mart has three climate change goals: (i) to reduce greenhouse gases at the existing stores, Sam's Club facilities and distribution centers around the world by 20% by 2012 (2005 baseline); (ii) to design and open a viable store prototype that is 25-30% more efficient and produce up to 30% fewer GHG emissions by the end of 2009 (2005 baseline); (iii) to double own fleet efficiency in the US by 2015 (2005 baseline) (Wal-Mart Stores, 2009, p. 37). Tesco is also an example for SMART objectives (Tesco, 2009b, p. 11). Against a baseline of 2006, the group wants to halve: (i) emissions from existing buildings by 2020; (ii) distribution emissions of each case of goods delivered by 2012; (iii) emissions from new stores by 2020. Tesco has disclosed own carbon footprint for 2008: 4.9 million tons of CO_2-equivalent. Metro Group set a SMART objective: "to reduce CO_2 emissions from 406 kg per square meter of selling space in 2006 by 15% by the year 2015" (Metro Group, 2009, p. 9). Carrefour group did not present in its report SMART carbon-footprint objectives. There are general formulations such as "reduce GHG emissions linked to store operations" (Carrefour, 2009a, p. 50). Kroger does not present specific carbon-footprint objectives. However, indirectly, objectives related to the reduction in energy consumption have an impact on carbon-footprint. For example, using year 2000 as a base, Kroger aims at reducing the overall energy consumption of its stores by 30% by 2010 (Kroger, 2009, p. 8).

Target is aware of the need to reduce energy consumption and has obtained good results, but does not specify SMART objectives related to carbon-footprint.

Even if the six global players have formally expressed their commitment to sustainable development, not all have specified SMART objectives and detailed and systematic policies. Most objectives and policies refer to all the three components of sustainability (economic, social and environmental aspects). As regards the carbon-footprint objectives, the SMART objectives are identifiable for only three global players. A SMART approach of the objective-setting seems to lead to clearer and more systematic presentations of the carbon-footprint policies.

3. Carbon-footprint strategies and their results

The carbon-footprint policy of each global retailer is based on specific strategies and generates certain outcomes. However, the terminology used in their sustainability/corporate responsibility reports only rarely includes the terms "policy" and "strategy" to systematically present and detail own approach to carbon footprint. In addition, retailers seldom present distinctly their carbon-footprint policy. Most of the time, they refer to environmental policy, climate policy, environmental footprint. Consequently, the content of the carbon-footprint policy is revealed in a rather indirect than direct manner.

The information provided by the reports allows the identification of several carbon-footprint strategies employed by the six global retailers. Two sets of carbon-footprint strategies are implemented to different extents by these retailers. The former refers to own carbon footprint, in order to reduce the direct impact on the environment and climate. The latter is centered on the carbon footprint of the supply chain partners (suppliers and customers), in order to diminish the indirect impact on the environment and climate.

The strategies from the first set which refers to own carbon footprint are the following: (i) investing in renewable energy; (ii) increasing energy efficiency of own existing and new buildings/stores; (iii) assigning energy champions; (iv) centralized energy management system; (v) improving the energy efficiency of own trucks; (vi) use of alternative modes of transportation; (vii) backhauling; (viii) reducing own consumption of industrial products such as paper, packaging, check-out bags and consequently the carbon-footprint generated by their production. Several examples of such strategies are presented hereinafter.

To diminish own footprint, Wal-Mart has invested in renewable energy generated by a combination of wind and solar power projects (Wal-Mart Stores, 2009, p. 37). For 2009, Wal-Mart expects to produce 16 to 18 million kWh due to solar energy systems installed in 20 own stores from the U.S. and to consequently reduce its GHG emissions by 6,000 to 8,000 metric tons per year. Simultaneously, Wal-Mart entered a four-year wind power purchase agreement with Duke Energy for 350 own stores and facilities located in Texas. Due to this project, the company will avoid producing 139,870 metric tons of CO_2 emissions. Similar projects have started in Mexico, Canada, Puerto Rico and Japan.

Tesco uses alternative energy to reduce own carbon footprint of own sites. The energy sources are wind, sun, bio-gas, combined heat and power, as well as combined cooling, heat and power (Tesco, 2009b, p. 9). For example, ¾ of the energy consumed at the distribution center of Fresh and Easy (California, U.S.) are generated by 46,450 square meters of solar panels. In UK, due to solar and wind energy, Tesco expects to reduce the CO_2 emissions by

6,000 tons annually. As a first phase, 1200 sq.m. of solar panels were installed at the distribution center in Postrizin (Czech Republic) in 2009. The panels are expected to save 30 tons of CO_2 per year.

To improve the energy efficiency of own distribution centers, Wal-Mart employed the following tactics: retrofitting lighting fixtures, use of energy demand monitoring systems, integrating glycol cooling into the refrigeration system, installation of rapid doors, use of variable frequency drives in the refrigeration system, installation of solar panels and wind turbines (Wal-Mart Stores, 2009, p. 45). Wal-Mart also aims to design a viable store prototype that is 25-30% more efficient than existing stores and decreases by 90% the refrigerant use compared to the average own supercenter (Wal-Mart Stores, 2009, p. 28).

Carrefour energy consumption diminished by country and retail format (Carrefour, 2009a, p. 67). The 6% reduction in energy consumption of the group in 2008 compared to 2007 is equivalent to the annual energy consumption of 71 hypermarkets or a city of 75,000 French households (Angers, Grenoble). In 2008, hypermarkets (that represent 61% of the group's energy consumption) reduced their consumption by 7.8%.

Tesco opened in January 2009 a new store format which is friendlier to the environment. The store is located in Cheetham Hill, Manchester (Tesco, 2009a, p. 2). The new format will be a model for future stores because it has a 70% smaller carbon-footprint than an equivalent store built in 2006. The savings were achieved through energy efficiency measures (31%), use of natural refrigerants (20%) and use of natural, sustainable fuel in a Combined Cooling, Heat and Power plant (19%).

Another strategic initiative of Tesco is the training of thousands of staff members to be Energy Champions (Tesco, 2009a, p. 8). They have the responsibility to ensure that energy is not wasted and to encourage their colleagues to act similarly. Simultaneously, Tesco has reduced by 50% own energy use per square foot in the UK stores, against a baseline of 2000 (Tesco, 2009b, p. 7). In the UK, Tesco invested around £ 60 million in energy-saving and low-carbon technologies in 2008.

Metro Group has also reduced in own energy consumption per square meter. In 2008, group-wide, the level of energy consumption decreased by 2% to 436 kWh, compared to 2007 (Metro Group, 2009, p. 8).

Kroger has reduced own energy consumption by more than 24% or 1.77 billion kWh between 2000 and 2009 (Kroger, 2009, p. 8). These savings are equivalent to 1.2 million metric tons of GHG emissions or to 233,000 cars off the roads for one year in the U.S.

Target applies a centralized energy management system since 1989. The system is centralized at Target headquarters and allows company-wide energy policies.

To improve the energy efficiency of own fleet in the U.S., Wal-Mart installed fuel-saving technologies on the trucks, identified more efficient methods to load the trucks and the cases, improved the routing and eliminated the number of empty miles traveled by the trucks. In 2008, in the U.S., as a direct outcome of the measures for fleet energy efficiency improvement, Wal-Mart avoided generating 200,000 metric tons of CO_2. In addition, savings of USD 200 million were made. In the U.K., ASDA has a program called "Fewer and Friendlier Road Miles" to reduce the number of empty trucks on the road and apply new technologies. Thus, in 2008, ASDA saved 8 million road miles and avoided the

production of 10,222 tons of CO_2. Similarly, in Japan, in 2008, Seiyu decreased its CO_2 emissions by more than 13% compared to 2007 (Wal-Mart Stores, 2009, pp. 43-44).

Tesco considered the exact measures of products in order to improve the use of the vehicle capacities. Thus, the group filled own vehicles 42% more efficiently (Tesco, 2009b, p. 10).

Metro Group modernized own truck fleet. In 2008, the trucks have been adapted to the Euro 5 standard (Metro Group, 2009, p. 8). By the end of 2008, 40% of own trucks complied with this emission standard.

Kroger reduced by more than 3% the miles per unit shipped in 2008, compared to 2007 (Kroger, 2009, p.10). Kroger has a significant fleet consisting of 1,800 tractors (90% owned) and 8,000 trailers (60% owned) that make about 2,500 deliveries daily.

Carrefour uses alternative modes of transportation to reduce own carbon-footprint (Carrefour, 2009a, p. 58). For example, the group employs river transport from ports for imported products, rail transportation for long distances and combined rail-road transportation. In 2008, 41% of the imported goods were shipped by river and rail. This means 3,300 fewer trucks on the roads in France.

Backhauling implies that empty trucks that have delivered merchandise to stores are reloaded at nearby suppliers to resupply retailer's warehouses. Carrefour employs this strategy to diminish the carbon footprint.

Carrefour reduces own carbon-footprint by diminishing own consumption of industrial products such as paper, packaging, check-out bags and consequently decreases the carbon-footprint generated by their production (Carrefour, 2009a, p. 58). Compared to 2007, in 2008, the group announced a 14% reduction in free disposable plastic checkout bags distributed, respectively a saving of 12,800 tons of CO_2, the equivalent of the annual CO_2 emissions of 5,000 cars (Carrefour, 2009a, p. 51).

The second set of strategies aims at indirectly reducing the carbon-footprint of retailers based on the collaboration with the other supply chain members (suppliers and customers) to reduce their own carbon footprint. Among the strategies applied range the following: (i) channeling the carbon-footprint reduction efforts by products and product categories; (ii) encouraging consolidation and pooling by suppliers; (iii) use of software for a better vehicle planning; (iv) collaboration with suppliers to reduce the transportation distances; (v) helping customers to reduce their own carbon footprint by selecting products and brands based on the carbon labeling; (vi) helping consumers saving energy in their homes.

Regarding suppliers, in 2007, in the U.S., Wal-Mart has started collaborating with Carbon Disclosure Project (CDP) to measure the energy consumption and emissions along the supply chains of a pilot group of seven product categories: DVDs, toothpaste, soap, beer, milk, vacuum cleaners and soda products. In the U.K., in 2007, ASDA mapped the carbon embedded in the products of several suppliers of fresh foods like eggs, milk, potatoes, lamb and chicken. ASDA works with 100 dairy farms to calculate their individual carbon-footprint and help them reduce the embedded carbon (Wal-Mart Stores, 2009, p. 38).

Carrefour encourages suppliers to employ consolidation and pooling strategies (Carrefour, 2009a, p. 58). In essence, consolidation refers to suppliers that organize themselves to group their deliveries to the warehouses of the retailer using full trucks. Each truck carries

an assortment of products from several suppliers. The pooling strategy refers to the product transportation in full-trucks from a specific supplier to the retailer's warehouse.

Tesco has invested together with suppliers and haulage partners in new software with a view to reducing the number of empty vehicles on the road (Tesco, 2009b, p. 10). The results were savings of 3,590 tons of CO_2-equivalent per year.

Tesco is an example for the collaboration with suppliers to reduce transportation miles and generate carbon savings. For example, Tesco and Unilever cooperate to improve distribution efficiency by removing 173,000 lorry miles (278,416.5 km) by 2010.

As regards customers, in 2008, Wal-Mart has created home energy efficiency centers within nine Sam's Clubs from Southern California. Such centers offer members from roof-top solar panels, energy-efficient appliances, next generation efficient lighting, to low-flow toilets and showerheads. In 2009, all Sam's Clubs will include such centers.

Carbon-labeling is employed by Tesco. In February 2009, this global retailer was the first of the major retailers to carbon label 100 own-brand products in Ireland and the UK. Orange juice, washing detergents, potatoes, light bulbs range among the products which are carbon-labeled by Tesco (Tesco, 2009b, pp. 3, 11). In 2009, Tesco aims at introducing the system in South Korea. Wal-Mart, Carrefour, Metro, Kroger and Target do not refer to carbon-labeling in their sustainability/corporate responsibility reports.

Tesco helps customers reduce energy consumption in their homes and improve their carbon footprint. Since September 2008, in the UK, Tesco provides home insulation services (Tesco, 2009b, p. 12). The goals are to help 500,000 customers during a three-year period, to cut 5 million tons of CO_2 emissions and to reduce the aggregated value of the annual energy bill of Tesco's customers by around £180 million.

Conclusions

The policies aiming at ensuring the sustainable development encompass environmental issues, besides economic and social aspects. Within this framework, the carbon-footprint policy of companies is an integral part of their environmental responsibility. The article presented the results of the exploratory research relative to the carbon-footprint policy of the top ten global retailers. The importance of this research is determined and enhanced by the following arguments: (i) scarcity of studies about the carbon-footprint policies of retailers; (ii) absence of globally applied common procedures and regulations relative to the reduction of carbon footprint by retailers; (iii) relatively few efforts deployed by retailers to systematically and substantially reduce their carbon footprint.

The potential application of the research reveals a triple perspective. Firstly, the research provides the opportunity to better understand the policies applied by top global retailers for the reduction of the carbon footprint as integral part of their contribution to sustainable development. Secondly, the research results are the first strides made to ensure the possibility to compare the carbon-footprint policies of various retailers at global, regional, national or organizational scale. Thirdly, the exploratory research may be the preamble of descriptive research aiming at characterizing, measuring and evaluating the organizational policies for the reduction of carbon-footprint, in the field of retailing.

The research has revealed that only six organizations of the top ten global retailers have released sustainability or corporate responsibility reports. The carbon-footprint policies of these retailers are rather "immersed" in the environmental component of the sustainable development policy than presented as a distinct policy. The reason may be the fact that multiple factors may lead to reductions in CF. Two sets of policies have been identified – one focused on the direct reduction of own CF and another on the indirect reduction of own CF through the collaboration with suppliers and customers within the supply chain. The retailers which are positive examples are Tesco, Wal-Mart and Carrefour.

The exploratory research reveled that a comparison of the carbon-footprint objectives and policies of the top ten global retailers is relatively difficult. On one side, there are organizations that did not publish their carbon-footprint policy as part of the environmental component of the sustainability policy. On the other side, the approaches are very diverse from objective specification to presentation of a detailed framework of carbon-footprint strategies. This situation is very likely due to the fact that common reporting standards still have to be adopted by retailers. For the moment, most global retailers highlight the disparate aspects they have considered. A comprehensive picture about the carbon-footprint policies requires additional further efforts of exploratory and descriptive research.

Future research relative to the carbon-footprint policy of retailers may go beyond the objectives of the present study. Among the aspects that require further in-depth analysis, description or quantification range the following: (i) best practices in the filed of CF reduction of the retail companies worldwide; (ii) actual achievements - not only the formal commitment and declared policies - of the retail companies relative to the reduction of the carbon footprint; (iii) carbon-footprint measurement systems applied by companies and degree of comparability of the publicly available information about company achievements; (iv) national and regional comparisons of the specific carbon-footprint strategies and results of retailers; (v) impact of the carbon-footprint policy on the corporate image of the retailers among various groups of stakeholders such as: shareholders, employees, customers, local communities etc.; (vi) stimuli and barriers that influence the commitment of the retailers to the reduction on the carbon footprint; (vii) partnerships existing in the supply chains for the reduction of the carbon footprint of the entire network of companies involved in the production, manufacturing, distribution and retailing of products.

The carbon-footprint policy is a new challenge the global retailers have to face. At present, the responsibilities in this field are not very clearly and quantitatively defined. The formulation of carbon-footprint policies is still in the initial stage marked rather by public declarations of commitment than by clear plans and effective implementation. However, stakeholders will require in the near future more in-depth and systematic approaches to the measurement, control and reduction of carbon-footprint. A new market may be created for research, consulting and audit services to guide and verify the efforts of companies related to carbon footprint. The future will very likely bring more precise regulations and higher expectations from various categories of public.

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